

REMARKS/ARGUMENTS

Claims 17, 18 and 21 are pending in this application. Claims 1-16, 19-20 and 22-62 have been canceled. Claims 17 and 21 are being amended to incorporate limitations from claims 19 and 20 therein; support for the amendments is found in claims 19 and 20 of the application as filed. Reconsideration of this application in view of these amendments and the following remarks is respectfully requested.

Claims 17-19 were rejected under 35 U.S.C. §102 as fully met by U.S. Patent No. 5,189,876 to Hirota et al. (Hirota). Hirota was cited to show an exhaust gas purification system for a lean burn diesel engine provided with a catalytic reactor incorporating inlet and outlet ends, a catalytic converter, and a fuel injector. This rejection is respectfully traversed for the following reasons.

Hirota fails to show a system including the use of a perovskite catalyst that is effective to achieve up to 96.3% conversion of NO present in a diesel engine exhaust gas simply through the direct injection of diesel fuel upstream of the catalyst (see Table 3 at page 10 of the Applicants' specification). The Hirota system is instead complex and uneconomic, requiring a sub-system mounted with the engine for cracking and/or fractional distillation of the diesel fuel to produce a low-boiling point fuel feed that is required to achieve efficient NO conversion in the Hirota system. In fact, Hirota teaches expressly that direct injection of diesel fuel cannot successfully achieve NOx purification in lean-burn (diesel) systems (column 1, lines 46-51 of the patent).

For the above reasons, the Applicants respectfully submit that claim 17 is not fully anticipated by Hirota, and that the rejection under 35 U.S.C. §102 should therefore be withdrawn.

The Examiner rejected claims 20-21 of the application as unpatentable over Hirota taken with either of U.S. Patents Nos. 4,049,583 to Lauder or 4,134,852 to Volin. Lauder and Volin were cited to disclose perovskite type catalysts, the Examiner concluding that it would have been obvious at the time of the invention to utilize such catalysts in the system of Hirota to arrive at the invention. This rejection is respectfully traversed for the following reasons.

First, the substitution of the perovskite catalysts of Lauder or Volin into the system of Hirota would not have anticipated the invention because the resulting system would still not have provided for the direction injection of diesel fuel upstream of the catalyst. Nor would the adoption of such upstream injection have been obvious in view of the Hirota teaching that such injection does not work effectively for NOx reduction in lean burn engines.

Secondly, the skilled artisan could have no reasonable expectation that such a substitution would produce a successful result. The unpredictability of results in the field of catalysis is notorious and has often been taken note of by the courts. More importantly, the perovskite catalysts of both Lauder and Volin are three-way catalysts, therefore being designed for the simultaneous reduction of hydrocarbons, carbon monoxide and NOx in exhaust gases only in a very narrow range of engine air-to-fuel ratios. The fact that such three-way catalysts have been generally effective for the removal of NOx from lean-burn engines where the exhaust gases comprises excess air or oxygen, is noted by the Applicants at page 1, lines 21-32 of the specification.

The disclosures of Lauder and Volin clearly reflect this state of the art. Thus Volin shows a near total loss of NOx conversion efficiency for his perovskite catalysts with only a slight increase in exhaust air (air:fuel ratios above 14.7 as in Fig. 1 of the patent), while Lauder shows a rapid decrease to 0% nitrogen oxide conversion for his perovskite catalysts as excess oxygen in the exhaust gas approaches 1%. Neither reference can therefore be taken to suggest that the perovskite catalysts disclosed would be effective to reduce NOx emissions

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from lean-burn engines where substantial amounts of oxygen can be present in the exhaust gas.

On the above reasoning, the Applicants respectfully submit that there is no basis in any of the references for concluding that the Applicants' use of perovskite catalysts in a direct diesel-fuel-injected NOx rejection system would be successful for efficiently removing NOx in a lean-burn diesel engine exhaust environment. The very high conversion rates achieved in the Applicants' system, as demonstrated in Table 3 of the specification, are therefore clearly indicative of unexpected results.

For all of the above reasons it is respectfully submitted that remaining claims 17- 18 and 21 of the application are patentable over Hirota, Lauder and Volin, or any combination thereof. Accordingly favorable reconsideration of this application and allowance of the remaining claims are courteously solicited.

The Applicants believe that no extension of time is necessary to make this Reply timely. However, should it be necessary, the Applicants respectfully request that the Office grant such time extension pursuant to 37 C.F.R. § 1.136(a) as required to make this Reply timely, and hereby authorizes the Office to charge any necessary fee or surcharge with respect to said time extension to the deposit account Corning Incorporated, Deposit Account 03-3325.

Should the Examiner have any remaining questions or concerns whatever regarding this application or the Applicants' position in this matter, she is respectfully invited to contact the Applicants' undersigned representative at (607) 974-3294.

Respectfully submitted,



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